



Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

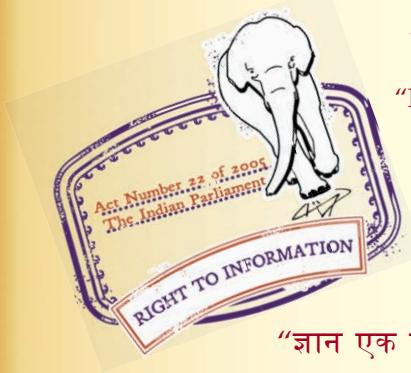
“Step Out From the Old to the New”

IS 4873-2 (2008) : Methods of laboratory testing of wood preservatives against fungi and borers (powder post beetles) : Part 2 Determination of threshold values of wood preservatives against borers (powder post beetles) [CED 9: Timber and Timber Stores]

“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartṛhari—Nītiśatakam

“Knowledge is such a treasure which cannot be stolen”



BLANK PAGE



PROTECTED BY COPYRIGHT

भारतीय मानक

फफूँदी और बेधकों (पाउडर पोस्ट बीटल) से लकड़ी की
सुरक्षा के प्रयोगशाला परीक्षण की पद्धतियाँ
भाग 2 बेधकों (पाउडर पोस्ट बीटल) से लकड़ी की
सुरक्षा के थ्रेशहोल्ड मान ज्ञात करना
(दूसरा पुनरीक्षण)

Indian Standard

METHODS OF LABORATORY TESTING OF
WOOD PRESERVATIVES AGAINST FUNGI AND
BORERS (POWDER POST BEETLES)

PART 2 DETERMINATION OF THRESHOLD VALUES OF
WOOD PRESERVATIVES AGAINST BORERS (POWDER POST BEETLES)

(*Second Revision*)

ICS 71.100.50

© BIS 2008

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (Part 2) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Timber and Timber Stores Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was first published in 1968 and covered the methods for the laboratory testing of wood preservatives against fungi. Details of preservatives, methods of preservative treatment of timber, etc, have been covered in IS 401 : 2001 'Preservation of timber — Code of practice (fourth revision)'. Based on the experience gained in the use of the standard, the first revision of the standard was brought out in 1993, additionally incorporating *Gloeophyllum trabeum* (Pers. ex. Fries) Murr. as a test fungi for preparation of test culture.

In its present revision, the standard has been brought out in two parts in view of requests for incorporation of method of laboratory testing of wood preservatives against borers (powder post beetles). The other part of the standard is:

Part 1 Determination of threshold values of wood preservatives against fungi (second revision)

The composition of the Committee responsible for the formulation of this standard is given at Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

METHODS OF LABORATORY TESTING OF WOOD PRESERVATIVES AGAINST FUNGI AND BORERS (POWDER POST BEETLES)

PART 2 DETERMINATION OF THRESHOLD VALUES OF WOOD PRESERVATIVES AGAINST BORERS (POWDER POST BEETLES)

(Second Revision)

1 SCOPE

This standard (Part 2) lays down the method for the laboratory testing of wood preservatives against borers (powder post beetles) by exposing the samples for four pairs of adult beetles or keeping them alongwith material infested with powder post beetles attack.

2 METHOD OF TEST

The method determines the toxicity of the surface applied with wood preservatives to the powder post beetles (*Lyctus species* and *Minthea rugicollis*).

The method is applicable to the tar-oil, water-borne and organic solvent types of wood preservatives. It enables comparisons to be made between preservatives which belong to any one of the types, since it is not possible to ensure that one test will accurately take into account the different mechanisms by which various preservatives operate under service condition.

3 PRINCIPLE

3.1 The principle of this test is to determine whether attack takes place, and adult subsequently emerge from samples of susceptible wood which have been initiated in the preservative and exposed to the test insect for egg laying. Control test with wood blocks of similar types which have been treated in the solvent only, as well as with initiated test pieces, are carried out at the same time, both types of control material being also exposed to the test insect for egg laying.

3.2 Preparation of Test Samples

3.2.1 The test samples shall be made from the timber of semul or rubber or mango and shall be of sizes 100 mm × 40 mm × 12.5 mm. The test samples will have the long axis parallel to the grain of the wood and the wide face tangential to the growth rings. These test samples shall then be open-piled and thoroughly dried in a well-ventilated room. These shall not be dried in a kiln or otherwise heated. Only those blocks which are clean, bright, free from knots and are of

heartwood showing no abnormalities in structure or rate of growth shall be used. Each test sample shall be tested for starch content and those in which it is inadequate, shall be rejected (see Annex A).

3.2.2 Before being treated in the preservative, the test samples shall be conditioned for two weeks at 25° to 30°C and 70 to 75 percent relative humidity to attain an equilibrium moisture content of approximately 15 percent. The end grain of the blocks shall be sealed with paraffin wax or other suitable sealant before treatment, in order to prevent undue penetration of the preservative through the ends.

Untreated control blocks shall be selected and end-coated in a similar manner. The total number of samples required for each test shall be as follows:

- a) 10 numbers to be treated in preservative, at each concentration used;
- b) 5 numbers to be treated with solvent only; and
- c) 5 numbers of untreated control samples.

3.3 Treatment Procedure

A series of dilutions of the preservative shall be prepared on a weight/weight basis. A minimum of five concentrations, arranged about the expected toxic limit, shall be used. In the case of a new preparation of which the approximate toxic limit is unknown, the concentration should be in a widely spaced geometric series in the first test and a more closely graded arithmetic series in subsequent tests.

If the preservative is soluble in water, freshly prepared aqueous solutions will be used. Preservatives that are insoluble in water shall be dissolved in a volatile liquid such as benzene or other suitable solvents which has been shown not to leave a residue toxic to the test insects. The test samples (10 percent concentration) shall be weighed and then completely immersed for 1 min in the solution, treatment with the most dilute solution being carried out first. A series of five control test samples shall be treated in a similar way in the solvent employed for dilution of the preservative.

If the preservative is in the form of an oil-in-water emulsion, the control test pieces shall be treated in an oil-in-water emulsion which has the same composition as the preservative, except that the toxic ingredients are omitted.

It is essential to follow the same dipping procedure in detail in all tests as slight variation may influence greatly the amount of preservative retained.

On removal from the treating fluid the surplus liquid shall be quickly shaken off the paraffin-coated ends blotted on absorbent paper and the blocks immediately reweighed. The amount of preservative taken up by the blocks shall be calculated from the rate of the liquid absorbed (weight after treatment minus the initial weight) and the concentration of the solution. The concentration of the preservative shall be expressed as kilogrammes per cubic metre of exposed wooden block. Five blocks per concentration shall be selected in which the weight of solution absorbed does not vary by more than 15 percent from the average absorption of the batch. The test samples shall then be dried, by passing air at a temperature of not higher than 30°C over them, till all the control test samples treated in the solvent only, have returned approximately to their initial weight.

All the test samples (including the five untreated control samples) shall then be stacked in open at room temperature for at least a month.

3.4 Test Insects

Adults of the powder post beetles, *Lyctus brunneus* *slephs* or *Minthia rugicollis* shall be used for the tests and these shall be obtained from laboratory cultures.

For initiation of culture, beetles are obtained from naturally infested wood stored outside, which have to be brought and maintained in the laboratory. Untreated timber such as semul/mango/rubber/bahera/dry tapiocca chips, which serve as feeder with starch, shall

be kept along with the infested sample for continuous multiplication of the beetles.

The test samples shall be stored singly in glass containers provided with cambric (finely woven cotton) cover, held in place with rubber bands to reduce the risk of mite infestation. Test samples per concentration, five untreated control samples and five treated with the solvent alone shall be exposed individually to four pairs of beetles or keeping them alongwith material infested with powder-post beetles attack. The condition during the test shall be 25° to 30°C and 70 to 75 percent relative humidity. When all the beetles are dead, they shall be removed.

3.5 Examination of Test Sample

The samples shall be stored until emergence of the first generation of adults from untreated control is in progress (6-8 months). After this has occurred, all the blocks shall be examined. Sample with no exit holes shall be finally split with an axe to ascertain whether live or dead larvae or tunnels are present.

3.6 Evaluation and Reporting of Results

The number of samples, treated and untreated, which contain exit holes shall be recorded, as well as the number of treated sample without exit holes in which live larvae are found.

The threshold value (toxic limit) shall be expressed as the interval between the highest concentration at which the adult beetles emerged or live larvae are found at the end of test and the concentration next highest in the series in which no adults emerge and all larvae are dead. These concentrations shall be expressed as kilogrammes per cubic metre of wood.

The concentration of treating solution found necessary to give these figures shall also be stated, as well as the diluents used and the interval between impregnation of treated samples and exposure to the infestation.

ANNEX A
(Clause 3.2.1)
METHOD OF TESTING FOR STARCH CONTENT

A-1 For the successful development of *Lyctus species* or *Minthea rugicollis* larvae it is necessary that adequate quantity of starch be present in the wood. This can be assessed by a visual test given below.

A-1.1 Reagent

A-1.1.1 Iodine Solution (0.5 percent) — Add 0.5 g of iodine to a solution of 1 g of potassium iodide crystals in 5 ml of water and dilute this solution to 100 ml water.

A-1.2 Procedure

It should be ensured that the surface of the wood to be tested is smooth and clean. The solution shall be applied with a small paint-brush, preferably to an approximate radial surface, that is the narrow side of the block. After the lapse of a minute or so, starch grains which are stained blue-black, will be clearly visible under a binocular microscope. Only blocks containing abundant starch grains indicated by development of blue colour, are suitable for use.

ANNEX B
(Foreword)
COMMITTEE COMPOSITION

Timber and Timber Stores Sectional Committee, CED 9

<i>Organization</i>	<i>Representative(s)</i>
In personal capacity (2989/D, 12th Main HAL II Stage, Bangalore-560008)	SHRI SHYAM SUNDER (<i>Chairman</i>)
Andaman Chamber of Commerce & Industries, Kolkata	SHRI HARISH KHAITAN
Bamboo and Cane Technology Centre, Guwahati	PROJECT COORDINATOR
Bamboo Society of India, Bangalore	SHRI A. C. LAKSHMANA Dr K. A. KUSHALAPPA (<i>Alternate</i>)
Central Building Research Institute, Roorkee	DIRECTOR
Directorate General of Civil Aviation, New Delhi	DIRECTOR GENERAL
Directorate General of Supplies & Disposals, New Delhi	DIRECTOR GENERAL
Directorate of Standardization, New Delhi	DIRECTOR
Engineer-in-Chief's Branch, Army Headquarters, New Delhi	SHRI C. R. SAHA SHRI N. B. SHELAR (<i>Alternate</i>)
Federation of Indian Plywood & Panel Industry, New Delhi	SHRI SAJJAN BHAJANKA SECRETARY (<i>Alternate</i>)
Forest Department, Bhopal	PRINCIPAL CHIEF CONSERVATOR OF FORESTS
Forest Department, Raipur	PRINCIPAL CHIEF CONSERVATOR OF FORESTS
Forest Research Institute, Dehra Dun	DR S. S. NEGI Dr VIMAL KOTHIYAL (<i>Alternate</i>)
Indian Academy of Wood Science, Bangalore	PRESIDENT
Indian Council of Forestry Research and Education, Dehra Dun	DIRECTOR GENERAL
Indian Plywood Industries Research & Training Institute, Bangalore	DIRECTOR SHRI S. PADMANABHAN (<i>Alternate</i>)
Institute of Wood Science & Technology, Bangalore	DIRECTOR Dr R. V. RAO (<i>Alternate</i>)
Karnataka State Forest Industries Corporation Ltd, Bangalore	SHRI V. P. HIREMATH SHRI S. SHIVA PRAKASH (<i>Alternate</i>)
Kerala Forest Research Institute, Peechi	DIRECTOR Dr GNANAHARAN (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
Kutty Flush Doors & Furnitures Co Pvt Ltd, Chennai	SHRI K. SANKARA KRISHNAN COL Y. G. KRISHNAN (<i>Alternate</i>)
Ministry of Defence, Gwalior	DIRECTOR SHRI H. C. PANT (<i>Alternate</i>)
Ministry of Environment & Forests, New Delhi	DEPUTY INSPECTOR GENERAL OF FORESTS
Rubber Board, Kottayam	DIRECTOR
Timber Development Association of India, Dehra Dun	SECRETARY
WIMCO Limited, Mumbai	CHIEF EXECUTIVE OFFICER
In personal capacity (606 B, I Block, III Stage, UVCE Layout, WOC Road, Basaveshwaranagar, Bangalore-560079, Karnataka)	SHRI K. DAMODARAN
BIS Directorate General	SHRI A. K. SAINI, Scientist 'F' & Head (CED) [Representing Director General (<i>Ex-officio</i>)]

Member Secretary
SHRI J. ROY CHOWDHURY
Scientist 'E' (CED), BIS

**Timber Terminology, Conversion, Seasoning, Preservation, Grading and
Testing Subcommittee, CED 9 : 1**

Institute of Wood Science & Technology, Bangalore	Dr R. V. RAO (<i>Convenor</i>)
Andaman Timber Industries, Kolkata	SHRI HARISH KHAITAN
ASCU Hickson Limited, Kolkata	SHRI RAJIV AGARWAL SHRI J. BASU (<i>Alternate</i>)
Borax Morarji, Coil	SHRI H. T. KAPADIA SHRI S. RANGARAJAN (<i>Alternate</i>)
Building Materials Technology Promotion Council, New Delhi	REPRESENTATIVE
Central Building Research Institute, Roorkee	DIRECTOR SHRI B. S. RAWAT (<i>Alternate</i>)
Central Mining Research Station (CSIR), Dhanbad	DIRECTOR
Contollerate of Quality Assurance, Kanpur	DIRECTOR
Directorate General of Civil Aviation, New Delhi	DIRECTOR GENERAL
Directorate General of Supplies & Disposals, New Delhi	DIRECTOR GENERAL
Directorate of Standardization, New Delhi	DIRECTOR
Federation of Indian Plywood & Panel Industry, New Delhi	SHRI JAYDEEP CHITLANGIA SECRETARY (<i>Alternate</i>)
Forest Department, Bangalore	PRINCIPAL CHIEF CONSERVATOR OF FORESTS
Forest Department, Dehra Dun	PRINCIPAL CHIEF CONSERVATOR OF FORESTS
Forest Department, Gandhinagar	PRINCIPAL CHIEF CONSERVATOR OF FORESTS
Forest Department, Government of Chhattisgarh, Raipur	PRINCIPAL CHIEF CONSERVATOR OF FORESTS
Forest Research Institute (Forest Products Division), Dehra Dun	SHRI V. K. JAIN SHRI VIMAL KOTHYAL (<i>Alternate</i>)
Forest Research Institute (Pathology Division), Dehra Dun	DR A. N. SHUKLA DR N. K. S. HARSH (<i>Alternate</i>)
Forest Research Institute (Systematic Botany Branch), Dehra Dun	DR S. A. S. BISWAS DR SMER CHAND (<i>Alternate</i>)
Forest Research Institute (Wood Anatomy), Dehra Dun	DR (SMT) SANGITA GUPTA DR P. K. PANDEY (<i>Alternate</i>)
Forest Research Institute (Wood Preservation), Dehra Dun	DR SADHANA TRIPATHI SHRI AZMAL SAMANI (<i>Alternate</i>)
Forest Research Institute (Wood Seasoning), Dehra Dun	SHRI NIRMAL UPRITI DR KISHAN KUMAR (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
Gurdit Institute Private Limited, Dharwar	SHRI YASH KARAN SINGH
Himachal Pradesh State Forest Corporation, Shimla	MANAGING DIRECTOR EXECUTIVE DIRECTOR (<i>Alternate</i>)
Indian Council of Forestry Research and Education, Dehra Dun	SHRI B. K. BHATIA SHRI S. K. KOHLI (<i>Alternate</i>)
Indian Institute of Technology, New Delhi	SHRI G. S. BENIPAL
Indian Plywood Industries Research & Training Institute, Bangalore	SHRI K. SHYAMA SUNDER SHRI S. Z. M. KAMAL (<i>Alternate</i>)
Indian Plywood Industries Research & Training Institute, Bangalore	SHRI K. C. MATHEWS SHRI M. VENUGOPAL NAIDU (<i>Alternate</i>)
Indian Plywood Industries Research & Training Institute, Bangalore	SHRI S. PADMANABHAN SHRI S. Z. M. KAMAL (<i>Alternate</i>)
Indian Rubber Wood Task Force, Kottayam	SHRI C. BHASKAR NAYAR SHRI V. J. MATHEW (<i>Alternate</i>)
Institute of Wood Science & Technology (Wood Properties & Uses Division), Bangalore	REPRESENTATIVE
Karnataka State Forest Industries Corporation, Bangalore	SHRI V. P. HIREMATH SHRI S. SHIVA PRAKASH (<i>Alternate</i>)
Kerala Forest Research Institute, Peechi	DIRECTOR REPRESENTATIVE (<i>Alternate</i>)
Kutty Flush Doors & Furnitures Co Pvt Ltd, Chennai	SHRI K. SANKARA KRISHNA COL Y. G. KRISHNAN (<i>Alternate</i>)
Madhya Pradesh Rajya Van Vikas Nigam Ltd, Bhopal	SHRI A. K. DUBEY
Ministry of Environment & Forests, New Delhi	DR BIPIN BEHARI
Ministry of Railways (Represented by RDSO), New Delhi	DIRECTOR GENERAL
National Test House, Kolkata	DIRECTOR (PHYSICAL)
Office of Development Commissioner (Handicrafts), New Delhi	DEPUTY DIRECTOR
Regional Research Laboratory, Jorhat	DIRECTOR
Rubber Research Institute of India, Kottayam	DIRECTOR
Sivakasi-Chamber of Match Industries, Sivakasi	REPRESENTATIVE
Southern Veneers & Wood Works Ltd, Tillicherry	SHRI P. K. HARISS
U.P. Forest Corporation, Lucknow	SENIOR MANAGER
In personal capacity (C/o American Connexion, 214, Phase II Vasant Vihar, Dehra Dun-248006, Uttaranchal)	DR SATISH KUMAR

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc: No. CED 9 (7380).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

website : www.bis.org.in

Regional Offices:

Telephones

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

{ 2323 7617
2323 3841

**Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi,
KOLKATA 700054**

$$\left\{ \begin{array}{l} 2337\ 8499, \ 2337\ 8561 \\ 2337\ 8626, \ 2337\ 9120 \end{array} \right.$$

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022

{ 260 3843
260 9285

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113

{ 2254 1216, 2254 1442
 2254 2519, 2254 2315 }

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400093

{ 2832 9295, 2832 7858
2832 7801, 2832 7802

Branches : AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM. VISAKHAPATNAM.